Piezoresponse force microscopy of ferroelectric thin films

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RIJKSUNIVERSITEIT GRONINGEN

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Front cover: PRphase three dimensional image of a 2x2μm^2 area of a PZT sample after poling a 5x5 array over a 1x1 μm^2 area: the peaks represent downward polarization (poled areas), while in the rest of the area the polarization is upward (virgin state).

Rear cover: representation of perovskite-type crystal unit cells showing downward and upward polarization configuration.

The image in the front cover and all the AFM images in this thesis were processed via WSxM by Nanotec (www.nanotec.es).

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Contents

Abbreviations

FeRAM	Ferroelectric Random Access Memory
DRAM	Dielectric Random Access Memory
PZT	$PbZr_xTi_{1-x}O_3$
PTO	$PbTiO_3$
SRO	$SrRuO_3$
STO	$SrTiO_3$
SPM	Scanning Probe Microscope
AFM	Atomic Force Microscope
R_{ROC}	Apex radius of AFM tip
TM-AFM	Tapping Mode AFM
SSPM	Scanning Surface Potential Microscopy
C-AFM	Conductive AFM
PFM	Piezoresponse Force Microscopy
PRphase	Piezoresponse phase
PRamplitude	Piezoresponse amplitude
LiA	Lock-in amplifier
PSD	Phase Sensitive Detector
TEM	Transmission Electron Microscopy
HRTEM	High Resolution TEM
PLD	Pulsed Laser Deposition